**DEPARTMENT OF DEFENSE**
**ARMED FORCES EPIDEMIOLOGICAL BOARD**
**5109 LEESBURG PIKE**
**FALLS CHURCH VA 22041-3258**

AFEB

**DEC 16**

MEMORANDUM FOR

The Assistant Secretary of Defense (Health Affairs)
The Surgeon General, Department of The Army
The Surgeon General, Department of The Navy
The Surgeon General, Department of The Air Force

SUBJECT: Screening for Sickle Cell Disease at Accession – 2003-04

1. References:

a. Memorandum, Office of the Assistant Secretary of Defense for Health Affairs, 18 March 2002, Screening for Sickle Cell Disease at Accession.

b. Memorandum, Office of the Assistant Secretary of Defense for Health Affairs, 18 March 2002, Sickle Cell Disease and Sickle Ceil Trait Testing and Safety Precautions for Sickle Cell Trait Positive Personnel.

c. Department of Defense Instruction 6130.4, Criteria and Procedure Requirements for Physical Standards for Appointment, Enlistment, or Induction in the Armed Forces 14 December 2000.

d. Department of Defense Directive 6130.3, Physical Standards for Appointment, Enlistment, or Induction, 15 December 2000.

e. Memorandum, Under Secretary of Defense for Personnel and Readiness, 22 November 1996, Sickle Cell Policy.

f. Memorandum, Deputy Secretary of Defense, 25 January 1985, Duty Restrictions Based on Presence of Hemoglobin SA in Military Personnel.

g. Memorandum, Armed Forces Epidemiological Board, 22 January 2002, Medical Screening for Accession Programs - Hemoglobin Screening.

h. Department of Defense Instruction 6055.7, Accident Investigation, Reporting and Recordkeeping, 3 October 2000.

i. Sickle Cell Working Group Report, 10 May 1995.

2. On 22 May 2002 the Armed Forces Epidemiological Board (AFEB) was presented with a request from the Assistant Secretary of Defense for Health Affairs (ASD(HA)) to make recommendations on screening for Sickle Cell Disease (SCD) at the time of accession into the Armed Forces. Specifically, six questions were brought before the Board:

- Is the present accession medical history and physical exam effective in identifying individuals with SCD? If not, would a more rigorous medical history and physical examination be adequate?
- Is testing for SCD at accession more appropriate than identification of individuals with SCD after they are accessed with disposition contingent on demonstrated performance, future risks, and deployability?
- If a testing program is recommended at accession:
    - Would universal screening be indicated?
    - What is the ethical responsibility of DoD concerning counseling for those identified with SCD and sickle cell trait (SCT) (recognizing that testing for SCD will also identify individuals with SCT)?
- What is the absolute risk of sudden death during training for an individual with SCT?
- When in the basic training cycle have exertional deaths associated with SCT occurred?
- Have exertional deaths associated with SCT occurred after basic training?

3. To assist the Board, presentations reviewing current and historical SCD and SCT policy were provided by Lieutenant Colonel Timothy Corcoran, Director, Medical Accession Standards, Office of the Assistant Secretary of Defense for Health Affairs. Additional presentations to the Board were provided by Colonel Margot Krauss, Chief, Department of Epidemiology, Accession Medical Standards Analysis & Research Activity (AMSARA), Mr. Terrence Lee, US Army Center for Health Promotion and Preventive Medicine, Disease and Injury Control, Dr. John Kark, Howard University Center for Sickle Cell Disease, Major Katerina Neuhauser, Public Health Consultant, US Air Force, Colonel John W. Gardner, Department of Preventive Medicine, Womack Army Medical Center, and Dr. C. M. Peterson, National Heart, Lung, and Blood Institute,

National Institutes of Health Sickle Cell Disease Advisory Committee. Dr. Cage S. Johnson, Professor of Medicine, University of Southern California, Director, Comprehensive Sickle Cell Center was also consulted on the issue of screening Armed Forces personnel for SCD and SCT.

4. Department of Defense (DoD) Instruction 6130.4, 14 December 2000 establishes physical standards, which, if not met, are grounds for rejection for military service. The blood and blood-forming tissue diseases that are causes for rejection for appointment, enlistment or induction are an authenticated history of the following:

- E1.2.1. Anemia. Any hereditary (282), acquired (283), aplastic (284), or unspecified (285) anemia that has not been permanently corrected with therapy.
- E1.2.2. Hemorrhagic Disorders. Any congenital (286) or acquired (287) tendency to bleed due to a platelet or coagulation disorder.
- E1.2.3. Leukopenia. Chronic or recurrent (288), based on available norms for ethnic background.
- E1.2.4. Immunodeficiency (279).

Per Wintrobe's Clinical Hematology, 10th Edition, 1999, the following definitions apply to the Boards discussion and recommendations concerning Sickle Cell:

- Sickle cell anemia = homozygous state SS (Hb A is absent)
- Sickle cell disease = clinically significant sickling syndromes
- Sickle cell trait = Hb A is > Hb S

5. What is the prevalence and consequence of SCD disease?

a. Sickle cell disease is a group of diseases characterized by the production of hemoglobin S (Hb S) resulting from the inheritance of a beta S gene and a gene for other abnormal hemoglobin that polymerizes with Hb S. Hb S molecules co-polymerize most effectively with other Hb S molecules and then in decreasing order with Hb C, D, O, A, J, and F. Approximately 70% of individuals with Hb S and 30% of individuals with Hb F do not exhibit clinical disease. Clinically significant sickling disorders that result in uncorrectable anemia are disqualifying for military service. Hb S conditions that are not disqualifying for military service include asymptomatic forms of hemoglobinopathies Hb SD (except D-Punjab) and Hb SG, approximately 20% of Hb SC disease, and SCT.

Sickle-cell trait (Hb AS) is the most common sickling hemoglobin disorder, affecting 8 percent of African Americans and 0.08 percent of the general population. Individuals with SCT are usually asymptomatic and lead normal lives while most persons with clinically significant SCD usually have complications from the disease starting at an early age.

b. Military Entrance and Processing Stations (MEPS) do not screen the blood of prospective recruits for any sickling hemoglobin disorders and the history and physical exam vary among officers and enlisted. According to data presented to the Board, the current screening at MEPS does not identify at least 50% of individuals with SCD. The Military Services have varying policies after accession related to screening for SCD and SCT with Navy, Marine Corps, and Air Force screening all enlisted recruits and the Army not conducting screening. The impact of SCD on DoD is reflected in the losses of personnel for existing prior to service (EPTS) separations and separations after serving 6 months on active duty. For EPTS SCD diagnosis, DoD loses approximately 33 individuals annually and for separations after serving six months on active duty, DoD loses approximately 7 individuals annually, for a total loss of approximately 40 individuals annually for SCD. The risk from sudden death related to SCD among military personnel is considered minimal including risk in the recruit training setting. However as medical related deaths are not uniformly investigated, limited data are available.

c. The current accession standard does not specifically disqualify individuals with SCD or SCT for appointment, enlistment, or induction into the Armed Forces. Uncorrectable anemia not SCD or SCT is the disqualifying condition. Screening by more careful history should detect most patients with disqualifying anemia and the magnitude of SCD is not sufficient to justify anemia screening with hemoglobin and hematocrit. Hemoglobin and hematocrit will not reliably detect those with SCT since they may not have anemia and the Assistant Secretary of Defense for Health Affairs has stated, "It is not appropriate to screen for a condition that is not disqualifying per the DoD Directive and Instruction."

6. What is the risk from SCT?

a. No evidence suggests any impaired exercise performance or increased risk of sudden death during normal conditions among SCT positive individuals. Under the most extreme conditions of heat, humidity, and possibly increased altitude, some evidence suggests that individuals with SCT have increased susceptibility to rhabdomyolysis, with the potential for renal failure and death, and possibly exercise-associated sudden death. Risk is high if one is poorly conditioned for an event, dehydrated, obese, sleep deprived,

at altitude, unable to loose body heat, and exerting heroic effort with disregard for effort-related symptoms. This risk can be practically eliminated by intervention to improve hydration, improve ability to sweat, and limit exercise when occlusive clothing or high ambient temperature increases the threat of excessive body temperature.

b. Among individuals with SCT, there is a significant incidence of hyposthenuria (30 - 40%), which compromises the ability to conserve water. There is no specific treatment available. Generous fluid replacement is therefore standard advice for all individuals with SCT. Although rare, splenic infarction has been linked with SCT, with most cases reported at higher altitude.

c. According to information prepared by LTC Lovell, data collected by the Services since 1996 suggests that screening alone for SCT is not an effective means of preventing fatal heat illness and heat injury. The following comparisons among the military services cover the period from January 1996 to September 2000.

**Data from January 1996 thru September 2000**

| **Service** | **Screen for SCT** | **Health Education (Counseling)** | **Special ID for SCT Positives** | **Number of SCT Recruit Deaths*** | **Number of Non-SCT Recruit Deaths*** |
|---|---|---|---|---|---|
| Army | No | -- | -- | 4 | 7 |
| Navy | Yes | Group | Red wristband, then red dog tag; wristband with PT. | 2 | 2 |
| Marines<br>- Parris Island<br>- San Diego | <br>Yes<br>Yes | <br>Group<br>Group | <br>None<br>Red dog tag | Combined (both sites)<br>0 | Combined (both sites)<br>0 |
| Air Force | Yes | Group | None | 0 | 1 |

* Recruits who have sudden and/or exertional death. The deaths are categorized by known SCT positive versus non-SCT (either negative or not tested).

During this period, Army, Navy and Air Force experienced death rates of about 1/100,000 for SCT-negative recruits. SCT-negative Marines experienced a rate of 2/100,000. The rate of death in SCT positive recruits is estimated at 40/100,000 for the Army, as actual recruit SCT prevalence is not available, and 49/100,000 for the Navy. The Air Force and Marines had no known SCT-positive recruit deaths over this interval. The low number of deaths since 1996 limits the value of comparing rates, however, these

rates are consistent with previous estimates. After entry training, the presence of SCT among individuals suffering unexpected exercise-related death is not available.

d. Published studies (Kark et al., 1994 and 1997) have reported an excess mortality from sudden unexplained death of 32 per 100,000 recruits with SCT. In comparison, among recruits without SCT, one in 100,000 die of unexplained causes during basic training (Kark et al. 1987; Charache 1988). It is important to note that this data was gathered prior to the implementation of vigorous preventive measures for exertional heat illness. Proper measures to prevent the consequences of dehydration and heat exhaustion have been shown to markedly reduce or eliminate the excess risk associated with SCT. Kark et al. conducted a 10 year prospective study, yet unpublished in the peer reviewed literature, looking at effective prevention of exertional heat illness during exercise during recruit training and observation of mortality. In February 1982 stricter rules for drill instructors were established to correct major deficiencies in preventive measures for exertional heat illness. The rules provided prevention based on 30 to 60 minute measures of the wet bulb globe temperature (WBGT) at the actual exercise site and direct observation that each recruit was drinking the amount of water recommended to prevent exertional heat illness. The intervention was applied to all trainees and did not require prior identification or different management of individuals with SCT. Participating recruit training centers adhered to this intervention while training 2.3 million recruits and non-participating centers did not adapt these unproven recommendations while training 1.2 million recruits. Based on exercise-related death rates observed from 1977 - 1981, 15 deaths were predicted among SCT positive recruits out of the 2.3 million total recruits at the participating centers. No deaths were observed among SCT positive recruits during the ten-year prospective period. There was also a trend toward better survival among the participating center recruits without SCT (19 deaths predicted but only 11 observed). Among recruits at non-participating centers there was no significant difference between predicted and observed deaths, regardless of SCT status.

e. Recruits with SCT have an increased risk of sudden death, which is primarily due to heat related illness. The risk is substantially elevated over non SCT trait recruits, concentrated but not limited to the recruit training period, and greatest when general preventive measures for heat illness are lacking. Unpublished data suggest that where general preventive measures were applied carefully, excess risk for both SCT and non-SCT recruits could be minimized; however, fluctuations in deaths suggest that optimal preventive measures have not always been maintained. While knowledge that one has SCT can motivate a person to better protect himself or herself from exertional heat illness, a beneficial effect on behavior or medical outcome has not been clearly demonstrated. Deficits in water concentration probably underlie the increased risk of heat related illness in SCT recruits but forensic investigations have not been thorough enough to determine underlying medical and training-related contributions to death.

Although risk of exertional sudden death is increased over non-SCT recruits, it is not so high as to justify general policies to restrict military duties.

f. The scientific evidence is not sufficient to determine whether or not screening for SCD, and thus identifying individuals with SCT, would prevent exertional deaths among those trait positive. The fact that deaths continue to occur in the military services that undertake screening suggests that screening alone will not eliminate exertional deaths in recruits with SCT. This may be in part that some deaths among trait positive recruits are unrelated to their SCT status (i.e. due to undiagnosed cardiomyopathies or conduction disturbances) and also to the fact that screening alone will not ensure appropriate preventive measures. Data on the variation in exertional illnesses over time suggest that screening may add little to consistent, rigorous general preventive efforts aimed at preventing heat illness for all recruits, which can reduce deaths in those with and without SCT. Nonetheless, given that such measures may be inconsistently applied across the Services, one cannot exclude a possible benefit to screening and informing individuals who carry SCT in order to educate them about factors that may increase their risk and preventive measures to reduce such risks (e.g. careful hydration, etc.).

7. The following recommendations are made concerning the questions to the Board related to testing for SCD:

**a. All applicants into the Armed Forces should be screened at accession with specific questions asking about past or present history or anemia, including SCD. Medical history and screening forms for officers and enlisted should be standardized to include specific questions: " Have you now or ever had anemia." Additional health history questions pertaining to the clinical presentation of anemia should be considered for inclusion on the accession medical history questionnaire. These questions should reflect state of the art screening techniques in this unique population and the DoD should consult and partner with experts in the field in developing these additional health history screening questions. The accession medical history should be explicit in explaining the risk of not revealing medical conditions such as anemia, including clinically significant SCD, which may have severe consequences if not disclosed. Patients reporting a history of anemia, or where physical exam suggest presence of anemia, should be evaluated for anemia using a hemoglobin and hematocrit. Specific screening for SCD or SCT with blood tests is not indicated at accession screening, in the absence of documented anemia. If anemia is documented which constitutes an excluding condition, individuals should be advised to seek an appropriate medical workup and counseling, to evaluate for hemoglobinopathies including SCD and potential reversible causes of anemia.**

**b. The effectiveness of post-accession screening for SCT to reduce mortality among those with SCT is uncertain given present data. Universal efforts to reduce risk of heat related illnesses are likely to provide the most important protection for recruits with and without SCT and need to be rigorously promoted. Screening may provide health information that is useful to some recruits, and it is possible (although unproven) that it will provide some additional measure of protection. At the same time, screening may pose possible risks if it leads to stigmatization and discrimination. If screening is implemented, it should be accompanied by appropriate medical and genetic counseling. Current data do not justify restriction of duties or activities of individuals with SCT.**

**c. The true association between SCT and risk of exertional death is difficult to determine due to inconsistent data on deaths occurring during and after recruit training. The Office of the Armed Forces Medical Examiner (OAFME) should establish forensic investigation standards for all exertion-associated deaths among Armed Forces personnel. The forensic investigation results along with all pathologic and clinical materials should be forwarded to the OAFME. The OAFME should review each forensic investigation, complete a pathology subspecialty review, and provide a report to the Assistant Secretary of Defense for Health Affairs within 60 days of the incident. The forensic investigation should include at a minimum:**

- **Thorough investigation, which includes medical and command issues pertinent to management of exercise and risk of exertional heat illness.**
- **Exercise history from the previous 48 hours including available WBGT records.**
- **Evaluation to include body temperature and blood tests adequate to detect exertional heat illness.**
- **Clinical and eyewitness accounts, lab data, clinical records, autopsy, and toxicology.**
- **To ensure complete reporting of circumstances surrounding the fatality, nothing found during the forensic investigation should be used for punitive action.**

AFEB
SUBJECT: Screening for Sickle Cell Disease at Accession - 2003-04

**The forensic investigation template developed by the OAFME should be presented to the Board for review and comment.**

8. The above recommendations were unanimously approved.

FOR THE ARMED FORCES EPIDEMIOLOGICAL BOARD:

STEPHEN M. OSTROFF, MD
AFEB President

JAMES R. RIDDLE, DVM, MPH
Colonel, USAF, BSC
AFEB Executive Secretary

6. Encls
1. Memorandum, Office of the Assistant Secretary of Defense for Health Affairs, 18 March 2002, Screening for Sickle Cell Disease at Accession
2. Memorandum, Office of the Assistant Secretary of Defense for Health Affairs, 18 March 2002, Sickle Cell Disease and Sickle Ceil Trait Testing and Safety Precautions for Sickle Cell Trait Positive Personnel
3. DASG-PPM-NC Position Paper, 3 July 2001, Screening for Sickling Hemoglobin Disorders for Prevention of Recruit Morbidity and Mortality
4. Memorandum, Under Secretary of Defense for Personnel and Readiness, 22 November 1996, Sickle Cell Policy
5. Memorandum, Deputy Secretary of Defense, 25 January 1985, Duty Restrictions Based on Presence of Hemoglobin SA in Military Personnel
6. Sickle Cell Working Group Report, 10 May 1995

AFEB 2003-04
SUBJECT: Screening for Sickle Cell Disease at Accession

CF:
Board Members and Consultants (w/encl)
Commander, United States Army Safety Center (w/encl)
Commander, Naval Safety Center (w/encl)
Commander, United States Air Force Safety Center (w/encl)
Commander, Headquarters United States Marine Corps (w/encl)
Commandant, United States Coast Guard (w/encl)
USD(AT&L) (w/encl)
J4-MRD (w/encl)
AFIP/OAFME
MEPCOM (w/encl)
DODMERB (w/encl)
AMSARA (w/encl)
Library of Congress (w/encl)
SAAA-PPO (w/encl)

THE ASSISTANT SECRETARY OF DEFENSE

1200 DEFENSE PENTAGON
WASHINGTON, DC 20301-1200

HEALTH AFFAIRS

MAR 18 2002

MEMORANDUM FOR EXECUTIVE SECRETARY, ARMED FORCES EPIDEMIOLOGICAL BOARD

SUBJECT: Screening for Sickle Cell Disease at Accession

The Service Safety Centers have requested a change to DoD policy to test all recruits at accession for sickle cell disease (SCD) and sickle cell trait (SCT). Present DoD policy precludes testing for SCD/SCT at accession. I request that the Armed Forces Epidemiological Board (AFEB) consider and make recommendations on the following questions:

(1) Is the present accession medical history and physical exam effective in identifying individuals with SCD? If not, would a more rigorous medical history and physical examination be adequate?

(2) Is testing for SCD at accession more appropriate than identification of individuals with SCD after they are accessed with disposition contingent on demonstrated performance, future risks, and deployability?

(3) If a testing program is recommended at accession:

a. Would universal screening be indicated?

b. What is the ethical responsibility of DoD concerning counseling for those identified with SCD and SCT (recognizing that testing for SCD will also identify individuals with SCT)?

(4) What is the absolute risk of sudden death during training for an individual with SCT?

(5) When in the basic training cycle have exertional deaths associated with SCT occurred?

(6) Have exertional deaths associated with SCT occurred after basic training?

As part of the deliberation process, the AFEB should receive briefings from the Office of the Assistant Secretary of Defense for Health Affairs, the Office of the Assistant Secretary of Defense for Force Management Policy, DoD Medical Examination Review Board, US Military Entrance Processing Command, the Accession Medical Standards and Research Activity, and appropriate subject matter experts both within DoD and the scientific community. My point of contact is Timothy Corcoran, Lieutenant Colonel, USAF, Medical Corps, (703) 681-1703, fax (703) 681-3655, or email Timothy.Corcoran@ha.osd.mil.

William Winkenwerder, Jr., MD

THE ASSISTANT SECRETARY OF DEFENSE

1200 DEFENSE PENTAGON
WASHINGTON, DC 20301-1200

HEALTH AFFAIRS

MAR 18 2002

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (M&RA)
ASSISTANT SECRETARY OF THE NAVY (M&RA)
ASSISTANT SECRETARY OF THE AIR FORCE (M&RA)
ASSISTANT COMMANDANT OF THE COAST GUARD
FOR HUMAN RESOURCES

SUBJECT: Sickle Cell Disease and Sickle Cell Trait Testing and Safety Precautions for Sickle Cell Trait Positive Personnel

References: (a) Under Secretary of Defense Policy Memorandum, "Sickle Cell Policy," November 22, 1996
(b) DoD Directive 6130.3, "Physical Standards for Appointment, Enlistment, or Induction," December 15, 2000
(c) DoD Instruction 6130.4, "Criteria and Procedure Requirements for Physical Standards for Appointment, Enlistment, or Induction in the Armed Forces," dated December 14, 2000
(d) Armed Forces Epidemiological Board recommendation, August 13, 1996

This memorandum responds to the letter from the Safety Centers requesting a change to DoD policy to test all recruits for sickle cell disease (SCD) and sickle cell trait (SCT) at initial accession as well as standardizing counseling and tracking guidance and to continue research on SCT.

DoD Directive 6130.3 (ref b) and DoD Instruction 6130.4 (ref c) do not disqualify individuals with SCT for appointment, enlistment, or induction into the Armed Forces. It is not appropriate to screen for a condition that is not disqualifying per the DoD Directive and Instruction. Individuals with SCD are disqualified under standard E1.2.1. of DoD Instruction 6130.4: "Anemia. Any hereditary (282), acquired (283), aplastic (284), or unspecified (285) anemia that has not been permanently corrected with therapy." In the Under Secretary of Defense Policy Memorandum, "Sickle Cell Policy" (ref a), the following statement was made:

> "Medical history screening guidelines at accession appear to be able to successfully exclude entry into the military of most individuals with sickle cell disease, and this screening shall be continued."

Mr. Edwin Dorn, the Under Secretary of Defense for Personnel and Readiness (USD (P&R)) in 1996, directed that testing for SCT shall not be conducted at accession. Mr. Dorn also stated that hemoglobin S testing "may still be conducted for individuals being considered for specific high risk occupations but must be conducted after entry into the military." This policy was

drafted after a review of Service data regarding sickle cell related mortality, the findings of the Sickle Cell Working Group Report (cited in your letter), and the recommendations from the Armed Forces Epidemiological Board (AFEB) (ref d).

A preliminary review of the data since 1996 concerning the efficacy of SCD screening by present methods raises the possibility that history and physical exam at application time may not be an adequate means of identifying individuals with SCD. This information is contrary to the premise of the 1996 USD (P&R) policy memorandum. Given the low prevalence of SCD in applicants, I have asked the AFEB to evaluate the efficacy of screening for SCD at the time of application to the Armed Forces, and to advise me on the matter. A copy of my letter to the AFEB is enclosed.

As co-chair of the Armed Services Biomedical Research Evaluation and Management (ASBREM) committee, I will ask that your request for continuing research on SCT be considered in the overall prioritization of biomedical research for DoD. I also recommend that you additionally address this request to the Under Secretary of Defense for Acquisition, Technology and Logistics, who has overall purview of research in DoD.

The responsibility to care for the health and well being of our Sailors, Soldiers, Airmen and Marines carries with it an obligation to base policy on sound scientific grounds balanced by prudent stewardship of the limited resources available to us. I look forward to the results of this review on this important issue. My point of contact for this issue is Lieutenant Colonel Timothy S. Corcoran at 703-681-1703 or e-mail at Timothy.Corcoran@ha.osd.mil.

William Winkenwerder, Jr., MD

Enclosure
As stated:

cc:
Surgeon General of the Army
Surgeon General of the Navy
Surgeon General of the Air Force
Commander, United States Army Safety Center
Commander, Naval Safety Center
Commander, United States Air Force Safety Center
Commander, Headquarters United States Marine Corps
Commandant, United States Coast Guard

DEPARTMENT OF THE NAVY
NAVAL SAFETY CENTER
375 A STREET
NORFOLK, VIRGINIA 23511-4399

23 Jul 01

**MEMORANDUM**

From: Commander, Naval Safety Center
To: Distribution

Subj: JOINT LETTER ON SICKLE CELL DISEASE (SCD) AND SICKLE CELL TRAIT TESTING (SCT) AND SAFETY PRECAUTIONS FOR SICKLE CELL TRAIT POSITIVE PERSONNEL

Encl: (1) Joint Letter

1. Enclosure (1) is forwarded for signature. Please forward to the next addressee indicated on the distribution list. Mailing envelopes are included for convenience.

2. Point of contact is Mr. Gene Beveridge who can be reached at (757) 444-3520 extension 7015.

C. E. BEVERIDGE
By direction

Distribution:
Commander, United States Army Safety Center
Commander, United States Air Force Safety Center
Commandant, United States Coast Guard
Commander, Headquarters United States Marine Corps
Under Secretary of Defense (Personnel and Readiness)

DEPARTMENT OF THE NAVY
Naval Safety Center
375 A Street
Norfolk, VA 23511-4399

DEPARTMENT OF THE ARMY
United States Army Safety Center
Fifth Avenue, Building 4905
Fort Rucker, AL 36362-5463

DEPARTMENT OF THE AIR FORCE
United States Air Force Safety Center
9700 G Avenue SE
Kirtland Air Force Base, NM 87117-5670

DEPARTMENT OF TRANSPORTATION
United States Coast Guard Safety Center
2100 Second Street SW, Room 5402
Washington, DC 20593

DEPARTMENT OF THE NAVY
Headquarters United States Marine Corps
2 Navy Annex, Room 3317
Washington, DC 20380

USMARCORPS USCG/SC HQ USAF/SC USASC COMNAVSAFECEN

6100
Ser 10/1652
30 Jul 01

JOINT LETTER

From: Commander, Naval Safety Center
Commander, United States Army Safety Center
(Attn: Brigadier General James E. Simmons)
Commander, United States Air Force Safety Center
(Major General Timothy Peppe)
Commandant, United States Coast Guard
(Attn: RADM Joyce Johnson, G-WK)
Commander, Headquarters United States Marine Corps
(Attn: Colonel Leif Larsen, Code SD)

TO: Under Secretary of Defense (Personnel and Readiness)

Subj: SICKLE CELL DISEASE (SCD) AND SICKLE CELL TRAIT TESTING SCT) AND SAFETY PRECAUTIONS FOR SICKLE CELL TRAIT POSITIVE PERSONNEL

Subj: SICKLE CELL DISEASE AND SICKLE CELL TRAIT TESTING AND SAFETY PRECAUTIONS FOR SICKLE CELL TRAIT POSITIVE PERSONNEL

Ref: (a) DoDI 6464.1 Hemoglobin S & Erythrocyte Glucose-6-Dehydrogenase Deficiency Testing Program, 29 Jul 81 ASD (HA)
(b) USD (P&R) memo OF 22 Nov 96
(c) USD (P&R) Working Group rpt of 10 May 95
(d) DSD memo of 25 Jan 85
(e) USD (P&R) memo (Heat illness prevention) of 6 Jun 95
(f) USD (P&R) memo (Sickle Cell Policy) of 6 Jun 95

1. This letter addresses serious safety concerns regarding the present Department of Defense (DoD) policy of testing personnel for Sickle Cell Disease (SCD) and Sickle Cell Trait (SCT) at accession points. Testing during accession was established in reference (a), however, that policy was changed by reference (b) which directed a change to DoDI 6465.1 and subsequent cessation of testing.

2. As stated in reference (c), SCT research dates from 1972 when DoD asked the National Academy of Sciences for recommendations on developing a Sickle Cell Policy. The Academy recommended that all accessions be screened, that those with SCD be disqualified for service, and that those with SCT be excluded from flying duties. DoD accepted all recommendations.

3. In reference (d), Deputy Secretary of Defense Taft cited inconclusive evidence in studies attempting to link SCT to a significantly increased risk to health and removed all duty restrictions for SCT. The Taft memorandum inferred there was significant concern that the sickle cell test might be used as a negative screening mechanism for African-Americans without solid scientific evidence of the associated risks. However, although African-Americans are the largest group at risk, there are other ethnic groups who share the risk.

4. Reference (c) also points out that later research documented an increased risk of death in recruits with SCT during Basic Military Training, stating that there is an 11 to 30 times greater risk of sudden exertional death (SED), although other research places the risk as high as 40 times greater. The report also concludes that many of these deaths are subsequent to heat illness and dehydration, and that prudent heat illness

prevention policies are the primary means to avoid SCT associated SED.

5. In light of this conclusion, reference (e) directed the services to take aggressive actions to reduce exercise-related illness and loss of life from exercise-related sudden death. Reference (f) continued the policy of testing all recruits at accession.

6. Reference (b) directed the discontinuation of this policy, stating that the screening guidelines at accession appear to successfully exclude applicants with SCD, and that individuals with SCT can be adequately protected by heat-illness prevention measures. However, the Army has had seven tragic cases of SED in soldiers with SCT since August 1999 despite the practice of heat illness protection measures. At present, both the Navy and Air Force test all recruits upon arrival at initial entry training bases, and the Army is considering implementing the same type of testing. However, there is no clear, unified, DoD policy.

7. There are still unanswered questions with regard to the risks associated with SCT. Additionally, there are family planning issues related to SCT that should be addressed. The decision to end SCT/SCD testing is not supported and poses a significant health and safety risk to our personnel. The screening guidelines contained in reference (b) are inadequate for effective identification of personnel with SCT/SCD. An enhanced and standardized counseling and tracking process should be maintained for personnel with SCT.

8. Recommendations found in reference (c) provide the strongest rationale for testing, counseling, and tracking. It states "Because of the increased risk demonstrated by in-depth research, it is prudent from a policy oversight perspective to ensure our people are aware of the increased risk associated with SCT and the precautions which minimize their life-long susceptibility. It is a prudent and cost effective action which will help conserve our most valuable resource - people" The Joint Service Safety Chiefs fully concur with this statement and believe that any other course of action would be a failure to

Subj: SICKLE CELL DISEASE AND SICKLE CELL TRAIT TESTING AND SAFETY PRECAUTIONS FOR SICKLE CELL TRAIT POSITIVE PERSONNEL

to fulfill our responsibility to care for the health and well being of our Sailors, Soldiers, Airmen and Marines.

9. Based on the above, request a change to DoD policy to test all recruits for SCD and SCT at initial accession, standardize counseling and tracking guidance, and to continue research on SCT.

DAVID ARCHITZEL
Rear Admiral, USN
Commander, Naval Safety Center

TIMOTHY E. PEPPE
Major General, USAF
Chief of Safety

JAMES E. SIMMONS
Brigadier General, USA
Director of Army Safety

JOYCE M. JOHNSON
Rear Admiral, USPHS
Director of Health and Safety
U.S. Coast Guard

H. C. DEWEY, III
Colonel, USMC
Director of Safety

THE ASSISTANT SECRETARY OF DEFENSE

1200 DEFENSE PENTAGON
WASHINGTON, DC 20301-1200

HEALTH AFFAIRS

MAR 18 2002

MEMORANDUM FOR EXECUTIVE SECRETARY, ARMED FORCES EPIDEMIOLOGICAL BOARD

SUBJECT: Screening for Sickle Cell Disease at Accession

The Service Safety Centers have requested a change to DoD policy to test all recruits at accession for sickle cell disease (SCD) and sickle cell trait (SCT). Present DoD policy precludes testing for SCD/SCT at accession. I request that the Armed Forces Epidemiological Board (AFEB) consider and make recommendations on the following questions:

(1) Is the present accession medical history and physical exam effective in identifying individuals with SCD? If not, would a more rigorous medical history and physical examination be adequate?

(2) Is testing for SCD at accession more appropriate than identification of individuals with SCD after they are accessed with disposition contingent on demonstrated performance, future risks, and deployability?

(3) If a testing program is recommended at accession:

   a. Would universal screening be indicated?

   b. What is the ethical responsibility of DoD concerning counseling for those identified with SCD and SCT (recognizing that testing for SCD will also identify individuals with SCT)?

(4) What is the absolute risk of sudden death during training for an individual with SCT?

(5) When in the basic training cycle have exertional deaths associated with SCT occurred?

(6) Have exertional deaths associated with SCT occurred after basic training?

As part of the deliberation process, the AFEB should receive briefings from the Office of the Assistant Secretary of Defense for Health Affairs, the Office of the Assistant Secretary of Defense for Force Management Policy, DoD Medical Examination Review Board, US Military Entrance Processing Command, the Accession Medical Standards and Research Activity, and appropriate subject matter experts both within DoD and the scientific community. My point of contact is Timothy Corcoran, Lieutenant Colonel, USAF, Medical Corps, (703) 681-1703, fax (703) 681-3655, or email Timothy.Corcoran@ha.osd.mil.

William Winkenwerder, Jr., MD

TAB B

DASG-PPM-NC

3 July 01

Position Paper

Subject: Screening for Sickling Hemoglobin Disorders for Prevention of Recruit Morbidity and Mortality

1. Purpose: To provide information to the Army leadership on issues related to screening recruits for sickling hemoglobin disorders and to provide recommendations in support of an AMEDD position on sickle cell trait (SCT) screening for all Army accessions.

2. Background and Supporting Facts.

a. Sickling hemoglobin disorders are caused by variants in the genes that produce hemoglobin. An individual who has SCT has one abnormal hemoglobin gene while individuals who have sickle cell disease (SCD) have two abnormal genes. Clinically significant sickling disorders that are disqualifying for military duty include, sickle-cell anemia (HbSS), sickle-β-thalassemia, sickle-C disease (HbCS), and sickle-D disease (HbDS). Sickle-cell trait (HbAS) is the most common sickling hemoglobin disorder, affecting 8% of African Americans and 0.08% of the general population. Individuals with SCT are usually asymptomatic and lead normal lives while persons with SCD usually have complications from the disease starting at an early age. Military Entrance and Processing Stations (MEPS) do not screen the blood of prospective recruits for any sickling hemoglobin disorders.

b. In 1996, the question of conducting sickle cell trait screening on all military recruits was raised and addressed by scientific experts inside and outside the military. In a recommendation to ASD (Health Affairs), the Armed Forces Epidemiology Board (AFEB) recommended that SCT screening should not be mandated for DOD military accessions, but to vigorously enforce heat injury prevention policies to reduce heat-related deaths in all recruits.

c. The Army currently screens for sickling hemoglobin disorders in aviation, special operations, and diving military occupational specialties (MOS). The Air Force, Navy, and Marines have screened all their accessions for sickling hemoglobin disorders for at least 10 years. Screening in the other services is justified on the basis of identifying individuals with SCD, not SCT alone. Moreover, individuals found incidentally to have SCT can be appropriately informed of any potential health risk (para. 2.e.) and be given genetic counseling related to their SCT status. Determination of SCT status may also be required for specific occupational duties, but IAW 1996 DOD policy, SCT alone cannot disqualify an individual for any MOS.

d. A series of sudden, unexpected deaths among recruits has caused the Army to review its policy for screening for sickle cell trait. Between 31 Aug 99 and 17 Aug 00, 8 Army basic training recruits (7 at Fort Jackson, and 1 at Ft. Knox) died suddenly. Three of five individuals tested were SCT positive (three were not tested). There were four additional sudden exertional deaths investigated by the Army Safety Center in non-recruits; two of these tested positive for SCT.

e. The scientific literature (based on a study by Kark, et al., of 2 million enlisted recruits in the U.S. Armed Forces, 1977 to 1981) indicates that recruits with SCT have an increased risk of sudden death of 32/100,000 compared to 1/100,000 among recruits without SCT. A follow-up study (Kark, et

al, unpublished data), suggested that vigorous heat injury prevention policies over a 10 year period (1982 to 1991) had resulted in no sudden exertional deaths in SCT positive recruits and a decrease in similar deaths among non-SCT individuals.

f. Data collected by the Services since 1996 suggests that screening alone for SCT is not an effective means of preventing fatal heat illness and heat injury. The following comparisons among services cover the period from Jan. 1996 to Sep. 2000. This interval reflects the period since the last formal DOD review of SCT screening. See table.

Jan '96-Oct '00

| Service | Screen for SCT | Health Education (Counseling) | Special ID for SCT Positives | Number of SCT Recruit Deaths* | Number of Non-SCT Recruit Deaths* |
|---|---|---|---|---|---|
| Army | No | -- | -- | 4 | 7 |
| Navy | Yes | Group | Red wristband, then red dog tag; waistband with PT. | 2 | 2 |
| Marines<br>-Parris Island<br>-San Diego | Yes<br><br>Yes | Group<br><br>Group | None<br><br>Red dog tag | Combined (Both sites)<br>0 | Combined (Both sites)<br>4 |
| Air Force | Yes | Group | None | 0 | 1 |

*Recruits who have sudden and/or exertional death. The deaths are categorized by known SCT positive versus non-SCT (either negative or not tested).

(1) Army, Navy and Air Force experienced death rates of about 1/100,000 for SCT-negative recruits. SCT-negative Marines experienced a rate of 2/100,000.

(2) Although the low number of deaths since 1996 limits the value of comparing rates, the rate of death in SCT positive recruits is 40/100,000 for the Army and 49/100,000 for the Navy. The Air Force and Marines had no known SCT-positive recruit deaths over this interval.

(3) These rates, albeit tenuous, are consistent with previous studies.

g. In the absence of an Army sickle cell blood screening program, some recruits with SCD enter the Army, despite the fact that SCD is a disqualifying condition. Based on Navy experience (approximately 16-20 recruits are found to have SCD each year) and Army hospitalization data, the best estimate is that the Army enlists 18 recruits with SCD annually. Once discovered, these recruits receive an EPTS discharge.

3. Analysis and Discussion.

a. Procedures. Screening Army recruits during accession to initial entry training (IET) would require an additional blood sample at the medical reception station at basic training sites. Those individuals with positive initial screening tests would require a second confirmatory blood test. Post-test counseling should be offered to all who are tested.

(1) Universal screening for sickling hemoglobin disorders would detect the approximately 18 recruits with SCD entering the Army annually. SCD is a disqualifying condition.

(2) Post-test counseling for SCT positive individuals would be highly recommended since SCT is a genetic condition with reproductive implications. Also, although there are no solid data on the adverse psychological impact and "labeling" that may accompany positive screening test results, the potential for it must be considered in any screening program of this kind.

b. The annual medical costs associated with screening for SCT on all Army accessions are based on the following: $4.00/initial test on 128,977 accessions - $520K; $16.00/confirmatory test on 2,226 estimated positives (1.5% positive in total population) - $36K; counseling for positives, ½ hour session ($50.00)/week (50)/training installation (5) - $15-25K; for a total cost of $571K-$581K. Balanced against these costs are the sickle cell crisis costs potentially avoided for the 18 recruits with SCD accessed and screened out each year in a universal screening program.

c. Effective heat injury prevention programs will reduce the risk of heat injury for all soldiers. All recruits are less vulnerable to heat injury when they are acclimatized to hot weather, maintain appropriate hydration, follow prescribed work-rest cycles (based on the wet-bulb globe temperature), and dress appropriately for the environmental conditions.

d. Severe heat injury must be avoided in SCT positive recruits because their risk of death from severe heat injury may be greater than other recruits. The vulnerability of SCT positive recruits to heat injury may be reduced by aggressive treatment regimen recommended for all recruits, including immediate cooling and rapid hydration when symptoms begin. SCT positive soldiers remain vulnerable to the risk of non-heat related sudden exertional death and cardiac death, even after recruit training.

e. Review of a proposed screening program from a medico-ethical perspective has produced the recommendation that recruits found to be SCT positive in this program should be allowed to reconsider and be released from service obligation, if desired. This recommendation is based on the premise that being SCT positive has potential risks in the military service (2.e., above) and little or no direct adverse health implications outside military service

4. AMEDD Recommendations.

a. Initiate mandatory screening for sickling hemoglobin disorders on all accessions. For persons found to be SCT positive, properly communicate risks of SCT, including reproductive implications. SCT positive individuals should be excused from service obligation, if they desire. For soldiers found to have SCD or other disqualifying sickling condition, separation would be mandatory.

b. Enforce Army-wide heat injury prevention measures for all recruits and officer accessions, including training of IET cadre in the recognition and treatment of heat injury.

c. Provide rapid and aggressive medical treatment for all soldiers including SCT positive individuals who develop symptoms of heat illness and injury. Medical support in the field (i.e., during PT tests) will allow a quick assessment and rapid medical interventions for recruits with signs and symptoms of heat injury, rhabdomyolysis, and cardiac events.

LTC Lovell/DSN 584-2464, Comm. (410)436-2464
Approved by COL DeFraites

# Under Secretary of Defense Policy Memorandum, "Sickle Cell Policy," November 22, 1996

UNDER SECRETARY OF DEFENSE
4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

PERSONNEL AND READINESS

NOV 22 1996

MEMORANDUM FOR SECRETARIES OF MILITARY DEPARTMENTS
ASSISTANT SECRETARY OF DEFENSE (FORCE MANAGEMENT POLICY)
ASSISTANT SECRETARY OF DEFENSE (HEALTH AFFAIRS)
ASSISTANT SECRETARY OF DEFENSE (RESERVE AFFAIRS)
DEPUTY UNDER SECRETARY OF DEFENSE (READINESS)
DEPUTY UNDER SECRETARY OF DEFENSE (REQUIREMENTS AND RESOURCES)

SUBJECT: Sickle Cell Policy

I recently reviewed the Department's policies and procedures concerning Service members with Sickle Cell Trait (SCT). After considering recommendations from the Armed Forces Epidemiological Board and Service data regarding sickle cell related mortality, I have decided that Hemoglobin S testing for SCT should not be mandated for military accessions. Medical history screening guidelines at accession appear to be able to successfully exclude entry into the military of most individuals with sickle cell disease, and this screening shall be continued. Available data on individuals with SCT indicate that most related sudden deaths can be prevented by adequate preventive measures against heat related illness. The cost of screening for a risk factor which rarely, if ever, will result in death under normal circumstances appears to outweigh the benefit of conducting the screening program.

Research on this issue will continue; the Accession Medical Standards Steering Committee will track hospitalizations, separations, and deaths for sickle cell and other hemoglobinopathies. Preventive measures against health related illness, such as adequate hydration, heat illness awareness programs and careful monitoring of basic trainees must be continued and improved.

Department of Defense Instruction 6465.1, "Hemoglobin S and Erythrocyte Glucose-6-Dehydrogenase Deficiency Testing Program," shall be modified to reflect that Hemoglobin S testing for SCT shall not be conducted at accession in accordance with the above guidance. Hemoglobin S testing, however, may still be conducted for individuals being considered for specific high risk occupations but must be conducted after entry into the military. My points of contact for this matter are Lieutenant Colonel Patricia Shackleton, (FMP)(MPP)/AP at 703-695-5529 and Colonel Doris Browne, (HA/Clinical Services) at 703-695-6800.

Edwin Dorn

THE DEPUTY SECRETARY OF DEFENSE

WASHINGTON, D.C. 20301

25 JAN 1985

MEMORANDUM FOR SECRETARY OF THE ARMY
SECRETARY OF THE NAVY
SECRETARY OF THE AIR FORCE

SUBJECT: Duty Restrictions Based on Presence of Hemoglobin SA in Military Personnel

Despite considerable research, the role of sickle cell trait as a significant risk factor in certain types of military duties (especially flying and diving) has not been demonstrated. Accordingly, all military occupational specialty restrictions on SCT bearers are to be removed, effective immediately. Further, such individuals are not to be subjected to any additional screening or physiological testing beyond that required for all candidates for that occupation. If an individual, under the usual operational conditions of the person's military specialty, develops a significant physiological event as the result of SCT which places him or her at risk for additional episodes, the individual may be disqualified from further such duties.

William H. Taft, IV

00723

Attachment

# SICKLE CELL WORKING GROUP REPORT

**Background** May 10, 1995

On December 19, 1994, the USD(P&R) directed the establishment of a working group to review policy related to initial testing of recruits for sickle cell trait. Major goals of the working group were to propose overall sickle cell policy (to include testing recommendations), to provide recommendations for additional research, and to explore other "political" considerations surrounding the issue.

**Sickle Cell Defined**

Sickle cell trait and disease are an inherited disorder of blood hemoglobin. They are found most predominantly in the Black population. About 8 percent of Blacks in the United States have sickle cell "trait," which indicates one parent had the sickle cell gene. Persons of Mediterranean heritage also have a high risk; however, no research was found to identify the exact level. The non-Black population has a .05 percent chance of having sickle cell trait or disease. With the trait only, one's life expectancy is near normal. If an individual inherits the sickle cell gene from both parents, the result is sickle cell "disease," in which case few live to age 40. About .5 percent of the Black population is born with sickle cell disease.

Sickle cell trait is manifested when oxygen levels in the blood are low. Exposure to high altitude is a typical triggering event. With sickle cell trait present, and a lack of oxygen, "sickled" hemoglobin cells may block small blood vessels restricting blood flow, and thus preventing oxygen from reaching parts of the body. Damage to the spleen and kidneys is likely if not quickly alleviated. Under these conditions, the body loses defense mechanisms against dehydration, which may contribute to problems during exercise in people with sickle cell trait.

**Policy History**

Available sickle cell research dates to 1972 when the Department asked the National Academy of Sciences for recommendations on development of sickle cell policy. The Academy recommended that all accessions be screened, that those with sickle cell disease be disqualified for service, and that those with sickle cell trait not be permitted to assume flying duties. The Department accepted all recommendations.

Citing inconclusive evidence in studies attempting to link sickle cell trait to a significantly increased risk to health, Deputy Secretary of Defense Taft removed all duty restrictions for sickle cell trait. The Taft memorandum (Tab A) states that there would be no further occupational limitations due to sickle cell trait (SCT), and that SCT individuals were not to be subjected to any additional screening or testing beyond that required for all candidates of a given occupation. This wording indicates there was significant concern at the time of the perception that the sickle cell test was used as a screening mechanism for African-Americans, without solid scientific evidence of the associated risks.

## Attachment

DoD Instruction 6465.1, Hemoglobin S and Erythrocyte Glucose-6-Phosphate Dehydrogenase Deficiency Testing Program, dated July 29, 1981 provides guidance on sickle-cell testing, and is still active today. Its requirement to test all new recruits and counsel those who test positive on the associated risks has been disregarded by the Army due to its interpretation of the Taft memorandum. Three of the Services—Navy, Marine Corps, and Air Force—currently test all enlisted recruits at basic training, and do not allow any exercise until the test results are negative, or if the test results show positive, a confirmatory test is completed. If positive, the individual is counseled on the increased risk associated with SCT, the reproductive implications of SCT, and sickle cell disease. On the other hand, the Army does not test recruits until after BMT, and then, only if the individuals are going into a high-risk job, i.e. one involving high altitude or under-water operations.

### Research Results

Research during the past 10 years documents an increased risk of death in recruits with sickle cell trait during basic military training. Depending on the data base analyzed, the SCT positive population has an 11 to 30 times greater risk of exercise-related death, unrelated to preexisting disease.

Many of the previous studies in this area are incomplete or inaccurate due to the inconclusiveness or error rate of medical information. First, there is no specific medical test which will always conclusively show cause of death as directly attributable to SCT. Second, in the most comprehensive studies available there are significant errors of diagnosis in death certificates (75 percent) and in autopsy protocols (50 percent).

The following chart shows the risk of exercise related sudden deaths unexplained by preexisting disease among Black recruits with and without sickle cell trait.

| | 1977-1981 | 1982-1986 |
|---|---|---|
| Deaths with/without SCT | 13 / 5 | 4 / 4 |
| Rate per 100,000 With/Without | 180 / 6.1 | 14 / 1.2 |

The researchers suspect that the attention given the SCT issue during the 1981 through 1986 period resulted in fewer deaths, due to enforcement of smart heat illness prevention measures at training sites.

The most comprehensive study on the issue shows that... "the specific types of death statistically associated with sickle cell trait have been exertional rhabdomyolisis, exertional heat stroke, and exercise-related sudden unexplained cardiac arrhythmia."[1] Significant to the issue of SCT at basic military training is that... "preliminary analysis of a small longitudinal study suggests that sudden fatal or life-threatening arrhythmias among recruits or young military personnel, regardless of [whether or not SCT positive], may often be secondary to exertional heat

[1] John A. Kark and Frank T. Ward: *Seminars in Hematology, Vol 31, No 3*, July 1994, "Exercise and Hemoglobin S."

stroke." In fact, the Kark study indicates that the likelihood for all populations of serious or fatal cardiac arrhythmia increases 3,000 fold during heat stroke, rather than during non-heat stressed exercise. One conclusion then, is that the risk of unexpected sudden death (for non-SCT individuals) with the presence of exertional heat stroke is higher than the risk due to SCT alone.

Studies also indicate that age presents an increased risk for those with SCT. As the age of recruits increases from the range of 17-18 years, to 23-24 years, the risk goes up by a factor of six. The studies available do not make definitive conclusions on the age factor, but suspect it is related to the rapid conditioning associated with basic training.

One issue raised in the Kark study is whether the rate of conditioning contributes to the increased risk of exercise related death, among both the SCT positive and total populations. Kark points out that recruits enter training camps from different areas of the country and may not be acclimated to the climate at BMT. This is one of the many questions left open with currently available research.

**Minimizing Risk**

Research studies of SCT related sudden deaths at BMT strongly indicate that the number one effort to minimize risks is to ensure proper training practices are followed to prevent heat illness. This action will significantly reduce risk to both the sickle cell positive population and the remainder of the recruit population as well. In addition to medical research which indicates heat illness precaution as the best prevention, operational analysis leads us in the same direction.

A study of Marine Corps training at Parris Island looked at 275,000 recruits and cadre from 1979 to 1990. There were 3,400 SCT positive recruits among this population. There were eight life-threatening or fatal cases of cardiac arrhythmia during this time, with about half of the cases involving confirmed exertional heat stroke--none of them were SCT positive individuals. According to the Uniformed Services University of Health Sciences (USUHS) study team, Marine Corps training has the lowest number of serious heat-related incidences, while they have the highest number of minor incidences. The reason for the dichotomy is that they also have an excellent heat prevention program and on-scene first aid. The Marine recruits are not allowed to participate in strenuous physical activity unless medics are in attendance.

**Testing - What Can It Accomplish?**

After a review of the historical policy actions and the medical information available, the study group concludes that testing all accessions is necessary. Because of the increased risk demonstrated by in-depth research, it is prudent from a policy oversight perspective to ensure our people are aware of the increased risk associated with SCT and the precautions which minimize their life-long susceptibility. It is a prudent and cost-effective action which will help conserve our most valuable resource--people.

# Attachment

Currently, the Services spend $288,000 on sickle cell testing. To test all accessions at basic military training would cost $455,000, while testing all applicants at Military Entrance Processing Stations (MEPS) would cost $870,000 per year. To test only Blacks and Mediterraneans at MEPS would cost $180,000; however, estimating the number of Mediterraneans is difficult.

**RECOMMENDATIONS:** USD (P&R) direct that:

1. Services review their physical training programs to ensure they have aggressive heat risk awareness, heat injury prevention, and heat injury treatment programs at military basic training sites.

2. Test all accessions at basic military training for blood disorders. Disqualify those with sickle cell disease (and other disqualifying hemoglobin disorders) and identify and counsel those with sickle cell trait on the medical and reproductive concerns associated with the condition.

3. Study deaths at basic military training and research risk factors for SCT individuals.

4. Reissue the DoD instruction on sickle cell policy.

Attachments:
A. Taft Memorandum
B. Sickle Cell Slides